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10/551,537

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EXAMINER

CHEN, CHRISTINE

ART UNIT

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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/551,537 | Applicant(s) VONDRACEK ET AL. | |
| | Examiner CHRISTINE CHEN | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18, 21, 24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 21, 24 and 25 is/are rejected.
- 7) ☒ Claim(s) 1 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/28/08 and 6/5/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 1-18, 21, and 24-25 are pending wherein claims 1-18, 21 and 24 are amended.

Status of Previous Objections/Rejections

The previous objection to claims 10 and 15 are withdrawn. The previous rejection of claims 1, 22 and 23 under 35 U.S.C. 112, second paragraph, is withdrawn. The previous rejection of claims 1, 3, 5-8, 10-11, 15 and 17 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) is withdrawn. The previous rejection of claim 2 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Bilgen (US 6458226) is withdrawn. The previous rejection of claim 4 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Kondo (US 5938865) is withdrawn. The previous rejection of claims 9, 14, and 16 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Staat (US 4798071) is withdrawn. The previous rejection of claim 12 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Poerink (US 3988915) is withdrawn. The previous rejection of claim 13 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Poerink (US 3988915) and further in view of Seale (US 6341767) is withdrawn. The previous rejection of claims 18, 21 and 24 under 35 U.S.C. 103(a) as being unpatentable over Kondo (US 5873960) in view of Kuroda (US 6372056) is withdrawn.

Claim Objections

1. Claims 1 and 17 are objected to because of the following informalities: Claim 1 includes the phrase “reheating the rods to a temperature *about* Ac3” however claim 17 includes the phrase “during the reheating *above* Ac3”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 10, 12-13 and 25 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear what is to be conveyed in the use of “marginal area” (claim 1 line 11 and claim 25 lines 7-8, 9-10, and 17), “desired transformation gradient” (claim 1 lines 11-12), and “critical degree of transformation” (claim 1 line 13). The same is true for “maximum transformation in the marginal area” (claim 10 lines 2-3), “marginal region” (claim 12 line 3 and claim 13 lines 2-3), and “desired gradient” (claim 25 line 11 and 18). As a result, the scope of said claims is indefinite.

Additionally, it is unclear what is to be conveyed in the use of the symbol “ Ψ ” (claim 10 line 3) and no definition is provided. As a result the scope of said claim is indefinite.

3. Claims 7 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "the roll gap" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Similarly, claim 16 recites the limitation "the skew rolling stand" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-15, 17-18, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bilgen (DE 19839383 used hereinafter with English equivalent 6458226) combined with Hathaway (US 2261878).

Bilgen discloses a process for the thermomechanical treatment of steel for torsionally strained spring elements, comprising the inductive heating of a starting material, particularly spring steel, at a rate between 80-150 K/s to a temperature between 900°C and 1200°C (e.g. a temperature above the recrystallization temperature of the initial material), austenitizing, holding the temperature for a short time, forming the material into a formed product at a temperature above the recrystallization temperature, quenching to martensite and tempering (see abstract, Summary of the Invention section, col. 3 lines 31-59, and claims).

While Bilgen does not disclose specify the shape of the starting material, it is well known in the art to use a rod as a starting material for production of spring elements.

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Additionally, it would be reasonable to expect that in Bilgen's method, wherein the temperature is held for a short time, there is an equalization of heating temperature of the starting material over its length.

It is noted Bilgen does not provide further detail on the nature of formation into a formed product in the disclosed method.

However, as disclosed by Hathaway, it is well known in the art to utilize the steps of rolling and winding to form a coil spring. An illustration of a spring-making apparatus is shown in Figures 1 and 2. When said apparatus is in use, the steel rod is fed through a straightener 11 and feed rolls 12 and 13, thereby straightening said rod, after which the rod is subject to winding or coiling 14. The process carried out by the described elements 11, 12-13, and 14, wherein the rod is drawn through rollers in order to straighten said rod, is equivalent to the skew rolling and winding into a coil spring described in instant claims 1, 21, and 24 (see Figures 1 and 2, and page 2 lines 29-42)

It would have been obvious to one of ordinary skill in the art to use the well-known forming steps of rolling and coiling as disclosed by Hathaway to the method taught by Bilgen in order to facilitate the formation of a coil spring.

With regards to the time for equalization of heating temperature of the rod as required by claim 5, it would have been obvious to one of ordinary skill in the art to optimize said time in Bilgen's method modified by Hathaway to at least 10 seconds in order to achieve complete conversion of the structure to austenite and to produce a uniform distribution of the carbon in the austenite.

With regards to the temperature difference over the length of the rod as recited in claim 6, it would have been obvious to one of ordinary skill in the art to optimize said temperature difference in Bilgen's method modified by Hathaway to a value not exceeding 5 K in order to facilitate a uniform distribution of the carbon in the austenite.

With regards to maintaining the heating temperature of the rod virtually up to its entry into the roll gap as required by claim 7, it would have been obvious to one of ordinary skill in the art to keep the heating temperature of the rod constant virtually up to its entry into the roll gap in Bilgen's method modified by Hathaway in order to facilitate a uniform structure of the starting material prior to rolling.

With regards to the average degree of degree of stretching as recited in claim 9, it would have been obvious to one of ordinary skill in the art to optimize the average degree of degree of stretching in the skew rolling of the rod to at least 1.3 in Bilgen's method modified by Hathaway in order to facilitate recovery of vibrational strength in the steel.

With regards to the maximum transformation in the marginal area as required by claim 10, it would have been obvious to one of ordinary skill in the art to optimize the maximum transformation in the marginal area to between 0.65 and 1.0 times the diameter of the rod and Ψ to at least 0.3 in Bilgen's method modified by Hathaway in order to facilitate recovery of vibrational strength in the steel.

With regards to the maximum local temperature elevation as recited in claim 11, it would have been obvious to one of ordinary skill in the art to optimize the maximum local temperature elevation during skew rolling to a value less than 50 K in Bilgen's

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method modified by Hathaway in order to facilitate a uniform local microstructure within the steel during the skew rolling process.

With regards to the correspondence between the direction of the twisting of the structure and the tension of a component stressed by torsion as required by claim 12, Bilgen's method leads to an improvement of the strength or toughness properties of the spring steel in the direction of strain of the torsionally strained spring elements (see col. 2 lines 7-13). Given Bilgen's disclosure, it would be reasonable to expect the direction of the twisting of the structure in the marginal region of the rod taught by Hathaway to correspond to the main direction of tension of a component stressed by torsion in Bilgen's method modified by Hathaway.

With regards to the direction of twist of the structure as recited in claim 13, it would have been obvious to one of ordinary skill in the art to optimize the direction of twist of the structure in the marginal region with respect to the axis of the rod to 35-65 degrees of angle in Bilgen's method modified by Hathaway in order to facilitate recovery of vibrational strength in the steel.

With regards to the property profile required by claim 14, given the commonalities between the described method and Bilgen's method modified by Hathaway, it would be expected that the method from the combination of Bilgen and Hathaway results in a structural distribution over the cross section of a finish-worked rod leads to a property profile which is adequate for the tension profile over the cross section in the case of flexural and/or torsional stress.

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With regards to the temperature range during skew rolling as recited in claim 15, Bilgen discloses a temperature range between roughly 800°C and 1000°C during forming steps (see col. 2 line 63-col. 3 line 5). It would have been obvious to one of ordinary skill in the art to perform the skew rolling of Hathaway in a temperature range of 700-1000°C (overlapping Bilgen's range) in Bilgen's method modified by Hathaway in order to facilitate skew rolling of the rod in an effective manner.

With regards to the temperature difference over the rod length during a reheating above Ac3 following skew rolling as required by claim 17, it would have been obvious to one of ordinary skill in the art to optimize the temperature difference over the length of the rod to a maximum of 5 K in order to in order to facilitate a uniform distribution of the carbon in the austenite.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Bilgen (DE 19839383 used hereinafter with English equivalent 6458226) and Hathaway (US 2261878) in view of Borowikow (DE 100 30 823).

Neither Bilgen nor Hathaway describes adjustable rollers in the rolling step of the process as seen in paragraph 5 above.

Borowikow, however describes a rolling mill with adjustable rollers which allows for manufacturing a round material having a variable diameter over its length (see abstract and page 4 paragraphs 4-6 of Machine Translation).

It would have been obvious to one of ordinary skill in the art to modify the rolling step of Hathaway with the rolling mill of Borowikow in the method of Bilgen in order to create a steel product with variable diameter and good surface quality.

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7. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bilgen (DE 19839383 used hereinafter with English equivalent 6458226) combined with Hathaway (US 2261878).

As described in paragraph 5 above, Bilgen discloses a process for the thermomechanical treatment of steel for torsionally strained spring elements, comprising the heating of a starting material to a temperature above the recrystallization temperature of the initial material), holding the temperature for a short time, forming the material into a formed product at such a temperature (a temperature above the recrystallization temperature), and quenching said product to a fine martensitic microstructure (see abstract, Summary of the Invention section, and claims).

While Bilgen does not disclose specify the shape of the starting material, it is well known in the art to use a rod as a starting material for production of spring elements. Additionally, it would be reasonable to expect that in Bilgen's method, wherein the temperature is held for a short time, there is an equalization of heating temperature of the starting material over its length.

It is noted Bilgen does not provide further detail on the nature of formation into a formed product in the disclosed method.

However, as disclosed by Hathaway, it is well known in the art to utilize the step of rolling in forming a coil spring. An illustration of a spring-making apparatus is shown in Figures 1 and 2. When said apparatus is in use, the steel rod is fed through a straightener 11 and feed rolls 12 and 13, thereby straightening said rod, after which the rod is subject to winding or coiling 14. The process carried out by the described

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elements 11 and 12-13, wherein the rod is drawn through rollers in order to straighten said rod, is equivalent to the skew rolling described in instant claim 25 (see Figures 1 and 2, and page 2 lines 29-42)

It would have been obvious to one of ordinary skill in the art to use the well-known forming step of rolling as disclosed by Hathaway to the method taught by Bilgen in order to facilitate the formation of a torsionally strained spring element.

With regards to the properties of the rod, given the commonalities between the described process and Bilgen's method modified by Hathaway, it would be reasonable to expect the marginal area of the rod to have a fine-grained martensite structure whereby said rod has a cross sectional strength profile that reaches a maximum value in said marginal area of said rod. Moreover, given the quenching of the rod to a fine martensitic microstructure as disclosed by Bilgen, it would be reasonable to expect the marginal area of the rod to have a fine-grained martensite structure.

8. Applicant's arguments with respect to claims 1-18, 21, and 24 have been considered but are moot in view of the new ground(s) of rejection.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

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F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-18, 21, 24 and 25 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 of copending Application No. 10/551538. With regards to independent claims 1 and 25 of the instant application, claims 1-17 of copending Application No. 10/551538 meet every limitation and anticipate these claims. Furthermore, an infringement of the instant application, 10/551537, must infringe copending Application No. 10/551538. With regards to dependent claims 2-18, 21, and 24 of the instant application, said claims are obvious or anticipated by claims 1-17 of copending Application No. 10/551538.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTINE CHEN whose telephone number is (571)270-3590. The examiner can normally be reached on Monday-Friday 8:30am-5pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

CC